List of Claims:

Claims 1-16 (cancelled)

Claim 17 (currently amended): A method for transmitting data on an xDSL digital communications link between a digital controller and an analog codec located within a personal computer system, the method comprising the steps of:

(a) generating a bit clock adapted for data transmission requirements of the xDSL digital communications link; and

(b) communicating the data and operational and/or control information, embedded in a plurality of words, between the digital controller and analog codec at a rate corresponding to said bit clock, wherein each of the plurality of words includes a portion of the data and a portion of the operational and/or control information, and wherein said operational and/or control information embedded in each of said plurality of words is transmitted over a data line during a first time period corresponding to a first number of bit clock periods, and the data embedded in each of said plurality of words is transmitted over said data line during a second time period corresponding to a second number of bit ~~block~~ clock periods.

Claim 18 (previously presented): The method of claim 17, wherein said operational and/or control information includes information relating to real time control settings for circuits located within the analog codec.

Claim 19 (previously presented): The method of claim 18, wherein said operational and/or control information further includes information relating to power management for an xDSL modem.

Claim 20 (previously presented): The method of claim 19, wherein said operational and/or control information is transmitted asynchronously with respect to the data.

Claim 21 (previously presented): The method of claim 20, wherein a start bit is used within said operational control information to indicate the beginning of a valid control data word.

Claims 22-26 (canceled)

Claim 27 (currently amended): A method of operating a multi-channel digital communications link within a personal computer system, the method comprising the steps of:

(a) generating a bit clock signal and a separate frame signal adapted for data transmission requirements of a plurality of separate communications channels within the personal computer system;

wherein said plurality of separate communications channels are supported by a communications bus coupling a digital controller and a plurality of separate communications circuits within the personal computer system;

(b) communicating data words between said digital controller and one or more of said plurality of separate communications circuits using said bit clock signal and said separate frame signal;

(c) grouping data words for one or more of said separate communications channels in a multi-channel data frame such that each of said plurality of separate communications circuits can be supported with a different transmit and/or receive data rate over said communications bus;

wherein operational and/or control information for each of said plurality of separate communications circuits is embedded ~~in~~ within each of the data words communicated through each of their respective communications channels.

Claim 28 (previously presented): The method of claim 27, wherein said frame signal is used to mark the boundary of each multi-channel data frame by having a first predetermined

value for a first number of bit clock cycles at the frame beginning, and said frame signal has a second predetermined value for the rest of said multi-channel data frame.

Claim 29 (canceled)

Claim 30 (previously presented): The method of claim 27, wherein said operational and/or control information is transmitted asynchronously with respect to data words.

Claim 31 (currently amended): The method of claim 27, wherein the digital controller ~~section~~ is located on a system motherboard of the computing system, and the separate communications circuits include at least one with an analog codec located at a position which is substantially free of electronic noise from other electronic components on said motherboard which could materially affect the operation of such analog codec.

Claims 32-36 (canceled)

Claim 37 (currently amended): A digital controller for use with an xDSL compatible modem comprising:

a) means for processing xDSL formatted data in accordance with an xDSL transmission protocol; and

b) means for generating control signals associated with maintaining an xDSL compatible data link within a computer system in accordance with said xDSL transmission protocol; and c) a digital interface for coupling the digital controller to an analog codec associated with the xDSL compatible modem and, said digital interface being configured such that:

[i] a plurality of receive lines can be used for receiving xDSL data; and

[ii] a plurality of transmit lines can be used for transmitting xDSL data;

[iii] a bit clock signal line can be used for carrying a bit clock signal adapted for said xDSL transmission protocol; and

[iv] a frame signal can be used for clocking xDSL data in the form of an xDSL data frame transferred in parallel over said plurality of receive lines and/or said plurality of transmit lines; and

[v] a control channel is provided so that said control signals can be passed between said digital controller and said analog codec ~~sections~~ of said xDSL compatible modem within at least one bit clock signal period of one or more of said xDSL data frames using said plurality of receiving lines and/or said plurality of transmitting lines; and

wherein said digital controller is adapted to be physically placed on a computer motherboard.

Claim 38 (previously presented): The digital controller of claim 37, wherein said control signals are embedded within an xDSL data word and asynchronously transmitted with respect to xDSL data words contained in said xDSL data frames.

Claim 39 (previously presented): The digital controller of claim 37, wherein said digital interface can handle a multi-channel xDSL data frame, said multi-channel xDSL data frame having at least two data channels, and wherein data can be transferred through a first channel during a first time period of said multi-channel xDSL data frame, and through a second channel during a second time period of said multi-channel xDSL data frame.

Claim 40 (original): The digital controller of claim 37, wherein said control signals relate to real time control settings for circuits located within the analog codec.

Claim 41 (previously presented): The digital controller of claim 37, wherein said control signals relate to power management operations to be performed by the xDSL compatible modem.

Claims 42-60 (canceled)

Claim 61 (currently amended): In a motherboard for use in a personal computing system, and which system is configured to support a plurality of separate communications channels using a multiplexed communication bus within the personal computing system, the improvement comprising:

(A) a digital controller controlling data transfers over the multiplexed bus, said digital controller being located physically on the motherboard and including:

[i] circuitry for processing data and control signals for each of the plurality of separate communications channels; and

(B) an analog front end circuit associated with a first one of said plurality of separate communication channels, said analog front end circuit being electrically coupled to the multiplexed bus but physically separated from said digital controller, said analog front end circuit including:

[i] line interface circuitry for coupling to a first data channel carrying analog data signals corresponding to first data transferred in accordance with a first communications standard and control signals associated with a first data transmission; and

[ii] circuitry for performing ~~A/D~~ A/D and ~~D/A~~ D/A operations on said analog data signals and first data signals respectively; and

(C) a digital interface for coupling said digital controller and analog front end circuit over the multiplexed bus, said digital interface including:

[i] a plurality of data receiving lines: and

[ii]a plurality of data transmitting lines; and

[iii] a clock signal adapted for supporting transmission requirements of each of said plurality of separate communications channels; and

wherein a plurality of separate control channels are implemented in time-multiplexed form over the multiplexed bus for each of said plurality of separate communications channels respectively.

Claim 62 (previously presented): The motherboard of claim 61, wherein said analog front end circuit is located on a xDSL modem riser card which is configured to be mounted substantially perpendicular to the motherboard.

Claim 63 (original): The motherboard of claim 61, wherein said digital controller is controlled in part in software by a host processor located on the motherboard.

Claim 64 (currently amended): The motherboard of claim 61, further wherein said digital interface uses a multi- channel data frame for communicating data over the multiplexed bus, said multi-channel data frame having at least two data channels, and wherein data for said first data channel is xDSL data for an xDSL modem transferred during a first ~~time~~ time period of said multi-channel data frame, and data for a second channel is transferred during a second ~~time~~ time period of said multi-channel data frame.

Claim 65 (previously presented): The motherboard of claim 61, wherein said receive and/or transmit signal lines can also be configured to transfer asynchronous transfer mode (ATM) cells.

Claim 66 (currently amended): The motherboard of claim ~~61~~ 65, wherein said ATM cells are associated with an ATM interface that is a Utopia I and/or II interface coupled to said digital controller over the multiplexed bus.

Claim 67 (currently amended): The method of claim 17, wherein said second ~~time~~ time period immediately follows said first ~~time~~ time period such that the data is transmitted immediately following said operational and/or control information.

Claim 68 (currently amended): The method of claim 17, wherein said first ~~rime~~ time period and said second ~~rime~~ time period occur during a word clock period, said word clock period being greater or equal to four bit clock periods.

Claim 69 (original): The method of claim 17, wherein said first number of bit clock periods corresponds to at least one bit clock period.

Claim 70 (original): The method of claim 17, wherein the data and said operational and/or control information are multiplexed over a plurality of data lines.

Claim 71 (currently amended): A method of transmitting data over a digital subscriber loop (DSL) based communications link between a DSL digital circuit section and a DSL analog circuit section comprising the steps of:

(a) generating a DSL bit clock signal adapted for data transmission requirements of the DSL based communications link; and

(b) transmitting DSL data over a data line between the DSL digital circuit section and the DSL analog circuit section based on said DSL bit clock signal; and

(c) transmitting DSL operational and/or control information over said data line based on said DSL bit clock signal; and

wherein said data line is time division multiplexed ~~so~~ such that ~~either a single bit of said DSL data or a single~~ one or more bits of said DSL operational and/or control information ~~is~~ are embedded within each word of said DSL data transferred between the DSL digital circuit section and the DSL analog circuit section over said data line ~~during a single bit clock signal period~~.

Claim 72 (original): The method of claim 71, further including a step: (d) generating a separate DSL word clock signal based on said DSL bit clock, such that a pulse of said separate

DSL word clock signal is used to mark the beginning of a sample word to be transferred over the DSL based communications link.

Claim 73 (original): The method of claim 71, wherein said DSL data includes data from digital samples and/or ATM cells.

Claim 74 (original): The method of claim 71, wherein said DSL operational and/or control information relates to power management of a DSL modem.

Claim 75 (original): The method of claim 71, wherein said DSL operational and/or control information relates to an interrupt for a software routine implemented as part of the digital circuit section.

Claim 76 (original): The method of claim 71, wherein said DSL operation and/or control information includes register settings for the DSL digital circuit section and/or the DSL analog circuit section.

Claim 77 (original): The method of claim 71, wherein said DSL operational and/or control information includes oscillator, and/or amplifier and/or filter settings for the DSL analog circuit section.

Claim 78 (original): The method of claim 71, wherein said DSL operational and/or control information has a predetermined length.

Claim 79 (previously presented): The method of claim 78, wherein said predetermined length can be varied at least between a first length in bits (Nc) and a second length in bits (2Nc).

Claim 80 (original): The method of claim 71, wherein said DSL operational and/or control information is transferred over a bus located on a computer motherboard.

Claim 81 (currently amended): The method of claim 75, wherein ~~said DSL digital circuit section is incorporated as part of a North Bridge and/or a South Bridge Chipset, and~~ said DSL analog circuit section is part of a separate analog front end located on a modem riser card.

Claim 82 (original): The method of claim 71, wherein one or more embedded operations channels is effectuated in the DSL based communications link.

Claim 83 (previously presented): A communications system incorporating an xDSL digital communications link, the communications system comprising:

(a) a digital controller for generating xDSL transmit data to be transmitted over the xDSL digital communications link to one or more separate xDSL channels; and

(b) a bit clock signal line for carrying a bit clock signal adapted for clocking said xDSL transmit data over the xDSL digital communications link; and

(c) a plurality of parallel transmit signal lines, separate from said bit clock signal line, and coupled to said digital controller for communicating said xDSL transmit data in parallel over the xDSL digital communications link to said one or more xDSL channels; and

wherein said digital controller also generates operational and/or control information that is transmitted over said xDSL digital communications link along with said xDSL transmit data, said operational and/or control information being used by the system in connection with controlling transmission of said xDSL transmit data through said one or more separate xDSL channels, and wherein the data and operational and/or control information are embedded in a plurality of words, such that each of the plurality of words includes a portion of the data and a portion of the operational and/or control information.

Claim 84 (original): The system of claim 83 wherein said operational and/or control information is implemented as an embedded operations channel (EOC).

Claim 85 (original): The system of claim 84 wherein said operational and/or control information is used to provide register settings and/or circuit settings for an analog front end circuit coupled to a digital subscriber loop (DSL).

Claim 86 (previously presented): The system of claim 83 wherein all bandwidth in said parallel transmit signal lines can be allocated to a single active channel.

Claim 87 (original): The system of claim 83 wherein said xDSL transmit data is transmitted within a data frame that includes data for M separate channels.

Claim 88 (original): The system of claim 87 wherein said data frame is clocked using a frame clock, which frame clock is provided on a frame clock signal line separate from said bit clock signal line.

Claim 89 (original): The system of claim 83 wherein said xDSL transmit data includes ATM cells.

Claim 90 (original): A method of transmitting data over a digital communications link between a digital controller and a plurality of analog CODECs supporting a plurality of respective data channels, the method comprising the steps of:

(a) generating a bit clock within a computer system bus adapted for data transmission requirements of the digital communications link;

(b) generating a separate frame signal within said computer system bus for indicating a boundary for a data frame carrying channel data for the plurality of respective data channels:

(c) communicating said channel data within said computer system bus between the digital controller and the plurality of analog CODECs based on said bit clock and said separate frame signal using time division multiplexing, such that channel data words for each of the plurality of respective data channels are clocked at different respective portions of said data frame;

wherein a communications protocol is used so that the digital communications link supports all of said plurality of respective data channels.

Claim 91 (original): The method of claim 90, wherein each of said plurality of respective data channels can have different transmit and/or receive data rates.

Claim 92 (original): The method of claim 90, wherein operational control information is embedded in each data frame for said plurality of respective data channels.

Claim 93 (original): The method of claim 92, wherein said operational control information consists of a control data word that is transmitted asynchronously.

Claim 94 (currently amended): The method of claim 90, wherein the digital controller section is located on a system motherboard of the computer system, and each of the plurality of analog CODECs is located at a position which is substantially free of electronic noise from other electronic components on said motherboard which could materially affect the operation of ~~such~~ each of the plurality of analog CODECs.

Claim 95 (currently amended): The method of claim 90 wherein the digital controller section and the plurality of analog CODECs are used by an xDSL modem, and the digital communications link is used to support an xDSL compatible data transmission.